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# COSTS OF PRODUCING SLOW-GROWING EVERGREENS (TAXUS) IN THE FIELD DIFFERENTIATED BY SIZE OF FIRM IN OHIO

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## ABSTRACT

The objective of this study was to determine annual production costs for field-grown slow-growing evergreens in Ohio differentiated by size of firm. This objective was accomplished by synthesizing two model field nurseries using the conceptual framework of economic engineering. Once the nurseries were synthesized, growing space was divided into five equal parts with each part being assigned a plant group. In the 50-acre nursery, slow-growing evergreens were allocated 8 acres of growing space and in the 200-acre nursery 35 acres. One specific species of slow-growing evergreen (Taxus) was chosen for detailed analysis.

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In the space allocated, 4,140 18-24 inch salable Taxus could be produced annually in the 50-acre nursery and 18,156 in the 200-acre. Total costs per salable plant were $17.47 in the 50-acre nursery and $9.39 in the 200-acre. These costs were based on 1985 figures.

## INTRODUCTION

Slow-growing evergreens, such as the various species of Buxus and Taxus, have long been planted for hedges, foundation plantings, and other locations where low maintenance is desirable. These plants have traditionally been grown in the field; however, new technological developments are now making it economically feasible to grow them in containers. Containers allow greater flexibility in production and marketing, and in most cases are less expensive than field production. On the other hand, risk is reduced when plants are grown in the field. Field-grown plants have greater buffering against variations in moisture, nutrients, and temperature. When subjected to conditions that would kill or severely damage container-grown plants with no overwintering protection, field-grown plants will often survive with little damage. It is also easier to "hold-over" field grown plants when market conditions are not favorable. These is especially true with slow-growing evergreens. It is anticipated that the majority of slow-growing

evergreens will continue to be produced in the field for the foreseeable future, especially in the case of the larger plants.

## MATERIAL AND METHODS

In the study, two model firms were synthesized using the conceptual framework of economic engineering wherein the 'best proven practice' was included in each model. They were synthesized based on the Columbus, Ohio, area. The complete synthesis included developing an appropriate production cycle; schematic drawings of the physical layout, including buildings and irrigation systems; lists of equipment and other items; a complete sequence by month and year of nursery operational steps beginning with propagation and ending with loading the finished product for wholesale distribution; and budgets for fixed and variable costs.

Data for this study were obtained from wholesale nurseries and nursery suppliers in Ohio during 1985. The basic goals in synthesizing the production facilities were to minimize labor expenses, flow and movement of plant material and equipment, water runoff, and initial investment, and to maximize the number of salable plants and keep future expansion possible. See Taylor et al. (1) for a detailed analysis of the physical plant, production system, and capital production budgets. The first step in the production cycle consisted of collecting cuttings

from field plants that are at least three years old. Cuttings were trimed and treated with a hormone solution and stuck in a heated sand bed in an "overwintering" house. During march of the third production year the 18 month old rooted cuttings are pulled from the propagation beds, root pruned by hand, and planted into four feet wide beds. The rooted cuttings are spaced 20" apart between rows and 7" within rows. After three years in the beds, they are dug, root and top pruned by hand, and planted in the field. Approximately 25% of the crop will be harvested and sold during the fall of the sixth field production year and another 25% dug, overwintered and sold during late Winter and early Spring of the seventh field production year. The remaining 50% of the crop will be harvested and sold during late Winter and Spring of the seventh field production year. After the harvest is complete, the land is left fallow and disked for weed control four times during summer months. The fields are plowed in the fall of the seventh production year in preparation for spring planting.

A model facility was synthesized for both a 50-acre and a 200-acre field nursery. The nursery operations were assumed to produce a diverse line of nursery stock each having its own unique production cycle. Commonly grown nursery stock was divided into five cultural groups. While not all inclusive, the groups do permit developing a range of per unit costs related to input costs and cultural factors. For analytical purposes, it

was assumed that each cultural group would occupy 20% of the field growing area (i.e. 50-acre nursery = 8 acres per group, 200-acre nursery = 35 acres per group. In addition to the field growing area, the 50-acre nursery had 10 acres and the 200-acre nursery 25 acres of production facilities including overwintering houses, propagation facilities, shipping area, holding area, liner bed area, pond, supply shed, machinery storage, machine shop, office, and rest rooms. Costs developed on slow growing evergreens (Taxus) therefore were based on the scale of complete nurseries, but were analyzed on the basis of percent of total space occupied. Companion studies in this publication report on fixed costs (page ), deciduous shrubs (page ), and shade trees (page ).

For detailed analysis on slow growing evergreens, one specific plant type (Taxus) was chosen, While it is recognized that other slow growing evergreens (i.e. Buxus) would have somewhate different requirements, it was felt that the requirements would not vary significantly in cost from the Taxus analyzed.

Costs were established for all factors of production including management and invested capital. In economic terms, costs associated with factors of production inputted by owner/operators are often referred to as 'opportunity costs' or the income these factors could have received if they were employed elsewhere. For example, owners could usually be employed as managers at other nurseries, and money invested in

land, buildings, irrigation systems, and equipment could have earned interest if it had been placed in financial institutions.

Capital requirements for establishing the nurseries were first determined (1). Second, capital requirements per salable plant capacity by size of nursery were established (1). Third annual fixed costs were calculated (see page ). Fourth, annual variable costs were determined for each of the two sized nurseries (Tables 1-3). Fifth, summaries were made for annual fixed and variable costs according to size of nursery (Table 4). This allowed cost comparisons based on size of nursery.

Most nurseries use cash rather than accrual accounting procedures. For this reason, the analyses were completed on a "cash" basis. Analysis on a cash basis does not give a true economic picture of the cost of producing a plant as it does not take into account the time value of money from the time the plant is planted until it is harvested. The analyses do, however, give a true estimate of the annual cost per salable plant based upon the study's assumptions.

Total annual production costs consist of both fixed and variable factors. Fixed costs are primarily made up of implicit costs such as depreciation on buildings and equipment, interest charges (both for borrowed and equity capital), and charges for management. Many nurserymen do not adequately consider fixed costs when computing costs of production. Fixed items are often

considered as residual claimants on income. For example, management is compensated if all other factors of production have been accounted for. As noted previously, annual fixed costs are discussed in greater detail in a companion article.

Variable Costs

Variable costs include all cost factors that vary with the quantity of plants being grown at one point in time. Variable costs are explicit, obvious, and normally paid out yearly. An example of variable costs is the amount of burlap that would be needed yearly for harvesting Taxus in a ball & burlap operation. Variable costs were subdivided into the following categories: propagation, materials, machinery and equipment, labor, and interest on operating capital (Tables 1 and 2).

Propagation. Propagation costs were made up of rooting media (sand), labor for collecting, stripping, sticking, maintainance, and harvesting, and for hormone powder.

Burlap and twine. Burlap and twine were provided for "ball and burlapping" each plant produced. The cost of the burlap and twine reflects a delivered cost to the nursery.

Polyethylene film. The cost of the white translucent film delivered to the nursery.

Strip tags. Strip tags were provided for identifying plants by botanical name, common name, state plant was grown in, and nursery producer. Costs include printing and shipping charges.

Chemicals. Chemical costs were subdivided into three cultural programs. The first is the fertilizer. For field operations the price included custom spreading for a custom blend and lime. Price for urea included delivery to the nursery. The second is herbicide, whose cost is the purchase price of the various pre-emergence and post-emergence materials. The third combines insecticides and fungicides. Purchase price reflects total cost for the chemicals as local distributors were assumed. A special category of "other" was included under chemicals. Adequate chemicals were budgeted for normal control of insects and diseases. The "other" category budgeted at 50% of the cost of the "normal" insecticides and fungicides was to take care of special problems.

Machinery and equipment. Variable machinery and equipment costs represent all costs incurred while equipment and machinery is in use. These costs are comprised of repair, fuel and lubrication/filter (Table 3). Repair cost per hour was calculated by multiplying initial cost by a stated repair percentage divided by the estimated lifetime use of the machinery in the 200-acre nursery in hours. The same repair cost per hour was used for both sized nurseries. Fuel costs were determined by multiplying units of fuel used per hour by the price per unit. Filter/lubrication cost was estimated at a constant factor of 15% of calculated fuel costs. Summation of repair, fuel and filter/lubrication costs result in total variable cost per hour

of machinery or equipment useage.

Hourly labor. The hourly basic wage was estimated at $5.25. An additional 32% or $1.68 was allocated for various fringe benefits making a total hourly labor cost of $6.93. Each major production activity was allocated necessary labor hours to accomplish assigned tasks.

Cost Summaries

After all cost factors were determined, they were summarized based upon cost per salable plant by size of nursery.

## RESULTS AND DISCUSSION

Annual fixed, variable, and total production costs of producing slow growing evergreens (Taxus) in the field in Ohio for 1985 are summarized in Table 4. In the 50-acre nursery, total annual costs were $72,426 or $17.47 per salable 18-24 inch plant. Fixed costs totaled $46,902 or $11.31 per plant and made up 65% of total costs. Based on percentage of total costs, land and improvements made up 10%, buildings 7%, machinery and equipment 18%, general overhead 28%, and interest on general overhead, insurance, and taxes 2%. Variable costs totaled $25,529 or $6.16 per plant and made up 35% of total costs. Based on percentage of total costs, propagation made up 4%, materials 5%, machinery and equipment 8%, labor 16%, and interest on operating capital 2%.

In the 200-acre nursery, total annual costs were $170,429 or $9.39 per salable 18-24 inch plant. Fixed costs totaled $88,905 or $4.90 per plant and made up 52% of total costs. Based on percentage of total costs, land and improvements made up 13%, buildings 4%, machinery and equipment 15%, general overhead 19%, and interest on general overhead, insurance, and taxes 1%. Variable costs totaled $81,524 or $4.49 per plant and made up 48% of total costs. Based on percentage of total costs, propagation made up 2%, materials 10%, machinery and equipment 7%, labor 26%, and interest on operating capital 3%.

Total annual costs were $8.08 per plant more in the 50-acre nursery than in the 200-acre. Of this $8.08, $6.41 or 80% were made up of fixed costs. On a per item basis, the 200-acre nursery's advantages were 50 cents on land and improvements, 76 cents on buildings, $1.78 on machinery and equipment, $3.17 on general overhead, and 20 cents on interest for general overhead, insurance, and taxes. The $1.67 difference for variable costs was 46 cents for propagation, 4 cents for material, 77 cents for machinery and equipment, 30 cents for labor, and 10 cents for interest on operating capital.

In the nurseries analyzed, it cost 46% less to produce a 18-24 inch salable slow growing evergreen (Taxus) in the 200-acre nursery than in the 50-acre. While the overall reduction was 46%, it was 57% for fixed costs and only 27% for variable. Large-sized commercial field nurseries are able to make more

efficient use of buildings, equipment, machinery, labor, and general overhead than is the case for small field nurseries.

One note of caution should be observed in comparing costs between the two sized nurseries. Each of the nurseries were analyzed based on the assumption that they would produce a diverse line of plants which included both shrubs and trees. This assumption might be unrealistic for the 50-acre nursery as a considerable amount of specialized equipment was required. It should also be noted that many operators of smaller nurseries might choose a different line of equipment than that budgeted. While the equipment budgeted is capable and labor saving, smaller nurserymen might have a surplus of family labor and choose less expensive, less labor saving equipment. Also, a small nursery might well operate its office, etc. out of the home.

Individual nurserymen might well experience or at least calculate costs considerably different than those depicted here. Most cost differences would probably be reflected in fixed rather than variable costs. Most fixed costs are implicit and their full impact may not be calculated by established nurserymen. Budgets presented assumed new facilities, machinery, and equipment. Most nurserymen have owned their land for many years and have used machinery and equipment. For the established nursery, budgeted fixed costs on land improvements, buildings, machinery, and equipment presented here would reflect replacement rather than 'book' value of depreciated items. Presented fixed

costs also placed a market value on management. Many nurserymen place little if any value on their own management when computing costs. Variable items, on the other hand, are explicit, experienced at least yearly, and easily accounted for. Variable costs presented here would be typical for the industry in Ohio and should be rather consistent regardless of age and size of the nursery.

## SUMMARY

Total annual costs per 18-24 inch salable slow growing evergreen (Taxus) were $17.47 in the 50-acre field nursery and $9.39 in the 200-acre field nursery. Fixed costs were $11.31 in the 50-acre nursery and $4.90 in the 200-acre for a differential of $6.41 per salable plant. Variable costs, on the other hand, were $6.16 in the 50-acre and $4.49 in the 200-acre for a differential of $1.67. These plant costs assumed propagation in the nursery (18 months), liner production in beds (3 years), and field growing (6 years), ball and burlapped harvesting, and an average size of 18-24 inches per salable plant.

These figures demonstrated that variable costs on a salable plant basis, at least over the size range of nurseries analyzed, were about 27% less when going from a 50-acre nursery to a 200-acre. This reduction was primarily accounted by efficiencies gained in propagation, and machinery and equipment. Fixed costs were reduced significantly as size of nursery was increased. This occurred because most of the fixed factors required to

operate the 50-acre nursery such as management, buildings, and most machinery and equipment were also adequate to operate the 200-acre. As the size of nursery increased, costs for fixed items of production were spread over more salable units, thereby reducing the fixed cost per plant.

## LITERATURE CITED

1. Taylor, Reed D., Harold H. Kneen, Elton M. Smith, David E. Hahn, and Stanley Uchida. 1985. Costs of Establishing and Operating Field Nurseries Differentiated by Size of Firm and Species of Plant in U.S.D.A. Plant Hardiness Zones Five and Six. Southern Coop. Ser. Bull. 315.

TABLE 1.--Variable Costs (Dollars) for Slow Growing Evergreens (Taxus) for a 50 Acre* Field Nursery, in Ohio, 1985.

| Item | Description | Unit | Cost per Unit** | Quantity | Total Variable Cost |
|---|---|---|---|---|---|
| Propagation*** | | | | | |
| Rooting media | Sand | cubic yd. | 6.50 | 9.00 | 58 |
| Collecting, stripping & sticking | 7914 units @ 1200/hr. | hrs. | 6.93**** | 6.60 | 46 |
| Maintainance | 50% of total prop. maint. hrs | hrs | 6.93 | 365.00 | 2,530 |
| Harvest | 7914 units @ 600/hr | hrs | 6.93 | 13.19 | 91 |
| Hormone powder | #8, I.B.A. | lbs. | 15.50 | 0.23 | 4 |
| Subtotal | | | | | 2,729 |
| Materials | | | | | |
| Burlap | 32" x 32" squares + twine | each | 0.45 | 4,140.00 | 1,863 |
| Polyethylene film | 4 mil white, 32 x 225' | each | 127.50 | 1.04 | 133 |
| Strip tags | 5/8" X 7" plastic strip tag | each | 0.02 | 4,140.00 | 83 |
| Chemicals | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton | 176.00 | 0.72 | 127 |
| | Custom spread, (lime) | ton | 20.00 | 1.28 | 26 |
| | Urea, 45-0-0 (fertilizer) | ton | 220.00 | 1.38 | 304 |
| | Soluble 20-20-20 (fertilizer) | ton | 1,411.20 | 0.14 | 198 |
| | Trifluralin 4 EC (Treflan) (herbicide) | gallon | 33.49 | 0.32 | 11 |
| | Simazine 80WP (Princep) (herbicide) | pound | 3.75 | 17.45 | 65 |
| | DCPA 75WP (Dacthal) (herbicide) | pound | 6.37 | 50.69 | 323 |
| | Malathion, 57EL (Cythion) (insecticide) | gallon | 18.28 | 16.34 | 299 |
| | Benomyl, 50 WP, (Benlate) (fungicide) | pound | 14.17 | 10.89 | 154 |
| | Carbaryl, 80WP (Sevin) (insecticide) | pound | 6.09 | 27.23 | 166 |
| | Chlorothalonil 10M cu. ft.(Termil) (fung.) | canister | 1.76 | 3.12 | 5 |
| | Other (i.e. Kelthane, Captan, Di-syston, Orthene, etc.)***** | | | | 310 |
| Subtotal | | | | | 4,067 |
| Machinery and Equipment | | | | | |
| | Tractor, 100 HP | hour | 17.00 | 32.54 | 553 |
| | Tractor, 34 HP | hour | 4.99 | 32.31 | 161 |
| | Articulated Loader/3,000lbs | hour | 14.81 | 26.98 | 400 |
| | Forks | hour | 0.01 | 73.24 | 1 |
| | Plow, 3-14" | hour | 6.57 | 1.02 | 7 |
| | Disk, 8' wide | hour | 4.23 | 2.09 | 9 |
| | Harrow, 10' wide | hour | 8.45 | 0.16 | 1 |
| | Cultimulcher, 10 wide | hour | 24.70 | 0.31 | 8 |
| | Spray rig with 10' boom | hour | 2.77 | 2.76 | 8 |
| | Transplanter, 3 row | hour | 26.79 | 1.23 | 33 |
| | Permanent irrigation/ well & pump 100HP | hour | 7.60 | 86.28 | 656 |
| | Inground irrigation - bed/field area | hour | 3.13 | 72.00 | 225 |
| | Above ground irrigation - bed area | hour | 1.83 | 72.00 | 132 |
| | Inground irrigation - storage & holding | hour | 5.65 | 12.00 | 68 |
| | Above ground irrigation - storage & hold. | hour | 11.05 | 12.00 | 133 |
| | Traveler gun | hour | 12.06 | 2.28 | 28 |

Table 1 Cont.

| Item | Description | Unit | Cost per Unit** | Quantity | Total Variable Cost |
|---|---|---|---|---|---|
| | Portable PTO pump, 40 HP (Emergency) | hour | (no costs budgeted) | | |
| | Airblast sprayer | hour | 1.01 | 21.78 | 22 |
| | Fertilizer injector | hour | 12.39 | 4.50 | 56 |
| | Transplanter, 2 row | hour | 12.00 | 2.03 | 24 |
| | Undercutter, bed | hour | 1.16 | 1.17 | 1 |
| | U-Blade | hour | 17.56 | 0.38 | 7 |
| | Sidedresser, 2 row | hour | 0.63 | 7.53 | 5 |
| | Cultivator, 2 row | hour | 0.95 | 12.56 | 12 |
| | Wagon, 4 wheel | hour | 0.48 | 10.80 | 5 |
| | Cultivator, 3 row | hour | 13.93 | 1.38 | 19 |
| | Truck, 1/2 ton pickup | hour | 8.42 | 346.67 | 2,919 |
| | Flatbed truck, 24' bed | hour | 14.87 | 26.98 | 401 |
| Subtotal | | | | | 5,894 |
| Labor | | | | | |
| | Labor hours | hour | 6.93**** | 1,369.51 | 9,491 |
| | Related labor hours, 20% | hour | 6.93 | 273.90 | 1,898 |
| Subtotal | | | | | 11,389 |
| Interest Charge on Operating Capital | Computed at 12% on an annual basis for 6 months | percent | 6.0 (0.06) | 24,079.00 | 1,445 |
| Total Variable Costs | | | | | 25,524 |
| Variable Cost per 18-24 Inch Salable Plant | Units available for sale in a given year | each | | 4,140.00 | 6.17 |

*Total Nursery - 50 acres, 40 acres of growing space, 10 acres production facilities, holding & field bed area, roads, etc. Slow Growing Evergreens - 10 acres, 8 acres of growing space, 2 acres production facilities, holding & field bed area, roads, etc., 4,140, 18-24 inch salable plants per year.

**Quantity discounts were applied to chemicals and other items.

***7,914 plants would be stuck in the propagation house annually where about 23% would be lost over a two year period leaving 6,088 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a three year period leaving 4,870 for transplanting into the field.

****Average basic wage before withholding taxes and fringes $5.25, taxes and fringes add 32% or $1.68 for a total of $6.93.

*****To achieve better pest and disease control, alternative chemical useage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Benomyl, and Carbaryl.

TABLE 2.--Variable Costs (Dollars) for Slow Growing Evergreens (Taxus) for a 200 Acre* Field Nursery, in Ohio, 1985.

| Item | Description | Unit | Cost per Unit** | Quantity | Total Variable Cost |
|---|---|---|---|---|---|
| Propagation*** | | | | | |
| Rooting media | Sand | cubic yd. | 6.50 | 18.00 | 117 |
| Collecting, stripping & sticking | 37,710 units @ 1200/hr. | hrs. | 6.93**** | 31.43 | 218 |
| Maintainance | 50% of total prop. maint. hrs. | hrs. | 6.93 | 400.00 | 2,772 |
| Harvest | 37,710 units @ 600/hr. | hrs. | 6.93 | 62.85 | 436 |
| Hormone powder | #8, I.B.A. | lbs. | 15.50 | 1.08 | 17 |
| Subtotal | | | | | 3,560 |
| Materials | | | | | |
| Burlap | 32" x 32" squares + twine | each | 0.45 | 18,156.00 | 8,170 |
| Polyethylene film | 4 mil white, 32' x 225' | each | 127.50 | 4.54 | 579 |
| Strip tags | 5/8" X 7" plastic strip tag | each | 0.02 | 18,156.00 | 363 |
| Chemicals | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton | 176.00 | 3.17 | 558 |
| | Custom spread, (lime) | ton | 20.00 | 5.16 | 103 |
| | Urea, 45-0-0 (fertilizer) | ton | 220.00 | 5.50 | 1,210 |
| | Soluble 20-20-20 (fertilizer) | ton | 1,411.20 | 0.55 | 776 |
| | Trifluralin 4 EC (Treflan) (herbicide) | gallon | 33.49 | 1.40 | 47 |
| | Simazine 80WP (Princep) (herbicide) | pound | 3.75 | 79.58 | 298 |
| | DCPA 75WP (Dacthal) (herbicide) | pound | 6.37 | 208.89 | 1,331 |
| | Malathion, 57EL, (Cythion) (insecticide) | gallon | 18.28 | 71.61 | 1,309 |
| | Benomyl, 50 WP, (Benlate) (fungicide) | pound | 14.17 | 24.75 | 351 |
| | Carbaryl, 80WP (Sevin) (insecticide) | pound | 6.09 | 119.36 | 727 |
| | Chlorothalonil 10M cu. ft.(Termil) (fung.) | canister | 1.76 | 13.36 | 24 |
| | Other (i.e. Kelthane, Captan, Di-syston, Orthene, etc.)***** | | | | 1,224 |
| Subtotal | | | | | 17,070 |
| Machinery and Equipment | | | | | |
| | Tractor, 100 HP | hour | 17.00 | 18.73 | 318 |
| | Tractor, 60 HP | hour | 11.68 | 23.77 | 278 |
| | Tractor, 34 HP | hour | 4.99 | 141.56 | 706 |
| | Articulated Loader/2,000lbs | hour | 6.67 | 82.25 | 549 |
| | Articulated Loader/3,000lbs | hour | 14.81 | 82.25 | 1,218 |
| | Forks | hour | 0.01 | 164.50 | 2 |
| | Plow, 3-14" | hour | 6.57 | 4.49 | 29 |
| | Disk, 8' wide | hour | 4.23 | 9.09 | 38 |
| | Harrow, 10' wide | hour | 8.45 | 0.67 | 6 |
| | Cultimulcher, 10' wide | hour | 24.70 | 1.34 | 33 |
| | Spray rig with 10' boom | hour | 2.77 | 12.01 | 33 |
| | Transplanter, 3 row | hour | 26.79 | 5.34 | 143 |
| | Permanent irrigation/well & pump 100 HP | hour | 7.60 | 118.00 | 897 |
| | Inground irrigation - bed/field area | hour | 3.13 | 96.00 | 300 |
| | Above ground irrigation - bed area | hour | 1.83 | 96.00 | 176 |
| | Inground irrigation - storage & holding | hour | 5.65 | 12.00 | 68 |
| | Above ground irrigation - storage & hold. | hour | 11.05 | 12.00 | 133 |
| | Traveler gun | hour | 12.06 | 10.00 | 121 |

Table 2 Cont.

| Item | Description | Unit | Cost per Unit** | Quantity | Total Variable Cost |
|---|---|---|---|---|---|
| | Portable PTO pump, 40 HP (emergency) | hour | (no costs budgeted) | | |
| | Airblast sprayer | hour | 1.01 | 95.49 | 96 |
| | Fertilizer injector | hour | 12.39 | 4.5 | 56 |
| | Transplanter, 2 row | hour | 12.00 | 8.90 | 107 |
| | Undercutter, bed | hour | 1.16 | 5.13 | 6 |
| | U Blade | hour | 17.56 | 1.65 | 29 |
| | Sidedresser, 2 row | hour | 0.63 | 33.00 | 21 |
| | Cultivator, 2 row | hour | 0.95 | 59.4 | 56 |
| | Wagon, 4 wheel | hour | 0.48 | 47.30 | 23 |
| | Cultivator, 3 row | hour | 13.93 | 6.03 | 84 |
| | Truck, 1/2 ton pickup | hour | 8.42 | 520.00 | 4,378 |
| | Flatbed truck, 24' bed | hour | 14.87 | 123.38 | 1,835 |
| Subtotal | | | | | 11,739 |
| Labor | | | | | |
| | Labor hours | hour | 6.93**** | 5,356.02 | 37,117 |
| | Related labor hours, 20% | hour | 6.93 | 1,071.20 | 7,423 |
| Subtotal | | | | | 44,540 |
| Interest Charge on Operating Capital | Computed at 12% on an annual basis for 6 months | percent | 6.0 (0.06) | 76,909.00 | 4,615 |
| Total Variable Costs | | | | | 81,524 |
| Variable Cost per 18-24 Inch Salable Plant | Units available for sale in a given year | each | | 18,156.00 | 4.49 |

*Total Nursery - 200 acres; 175 acres of growing space, 25 acres production facilities, holding & field bed area, roads, etc., Slow Growing Evergreens - 40 acres; 35 acres of growing space, 5 acres production facilities, holding & field bed area, roads, etc., 18,156, 18-24 inch salable plants per year.

**Quantity discounts were applied to chemicals and other items.

***34,710 plants would be stuck in the propagation house where about 23% would be lost leaving 26,700 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost leaving 21,360 for transplanting into the field.

****Average basic wage before withholding taxes and fringes $5.25, taxes and fringes add 32% or $1.68 for a total of $6.93.

*****To achieve better pest and disease control, alternative chemical useage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Benomyl, and Carbaryl.

TABLE 3.--Estimated Variable Cost per Hour of Use for Machinery and Equipment for Field Nurseries, in Ohio, 1985.

| Item Number | Item | New Cost (dollars) | Expected Life (years) | Estimated Annual Use: 50 Acre* Nursery (hours) | Estimated Annual Use: 200 Acre** Nursery (hours) | Estimated Cost per Hour of Use: Repairs*** (dollars) | Fuel**** (dollars) | Lubrication and Filter (dollars) | Total (dollars) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Tractor, 75 HP | 28,278 | 10 | 217 | 494 | 5.15 | 10.30 | 1.55 | 17.00 |
| 2 | Tractor, 60 HP | 20,419 | 10 | -- | 583 ea | 3.15 | 7.42 | 1.11 | 11.68 |
| 3 | Tractor, 34 HP | 14,504 | 10 | 169 | 632 | 2.07 | 2.54 | 0.38 | 4.99 |
| 4 | Flatbed truck | 42,000 | 10 | 383 | 1,702 | 2.22 | 11.00 | 1.65 | 14.87 |
| 5 | Articulated Loader/2,000lbs | 25,000 | 10 | -- | 600 | 3.75 | 2.54 | 0.38 | 6.67 |
| 6 | Articulated Loader/3,000lbs | 38,000 | 10 | 328 | 600 | 5.70 | 7.92 | 1.19 | 14.81 |
| 7 | Tree Spade | 8,490 | 2 | 181 | 641 | 5.30 | | | 5.30 |
| 8 | Forks for loaders | 1,100 | 10 | 328 | 1,200 | 0.01 | | | 0.01 |
| 9 | Plow | 2,616 | 10 | 8 | 32 | 6.57 | | | 6.57 |
| 10 | Disk | 3,900 | 10 | 15 | 60 | 4.23 | | | 4.23 |
| 11 | Harrow | 650 | 10 | 2 | 5 | 8.45 | | | 8.45 |
| 12 | Cultimulcher | 3,800 | 10 | 3 | 10 | 24.70 | | | 24.70 |
| 13 | Spray rig (Boom Sprayer) | 1,407 | 7 | 13 | 58 | 2.77 | | | 2.77 |
| 14 | Transplanter, 3 row | 7,500 | 10 | 5 | 21 | 26.79 | | | 26.79 |
| 15 | Transplanter, one row | 5,000 | 10 | 93 | 407 | 0.92 | | | 0.92 |
| 16 | Permanent irrigation, well+pump | 36,396 | 20 | 221 | 323 | 0.56 | 6.12 | 0.92 | 7.60 |
| 17 | Inground irr. bed-field***** | 34,606 | 20 | 151 | 221 | 3.13 | | | 3.13 |
| 18 | Above ground irr. bed-field***** | 4,345 | 5 | 144 | 190 | 1.83 | | | 1.83 |
| 19 | Inground irr. storage/hold***** | 16,957 | 20 | 60 | 60 | 5.65 | | | 5.65 |
| 20 | Above ground irr. S. & H.***** | 8,286 | 5 | 60 | 60 | 11.05 | | | 11.05 |
| 21 | Traveler***** | 22,000 | 10 | 17 | 73 | 12.06 | | | 12.06 |
| 22 | Portable irr. pump (emergency) | 425 | 10 | -- | -- | -- | -- | -- | -- |
| 23 | Airblast sprayer | 3,600 | 7 | 94 | 406 | 1.01 | | | 1.01 |
| 24 | Fertilizer injector | 858 | 5 | 9 ea | 9 ea | 12.39 | | | 12.39 |
| 25 | Transplanter, 2 row | 5,600 | 10 | 8 | 35 | 12.00 | | | 12.00 |
| 26 | Undercutter - bed | 285 | 7 | 5 | 21 | 1.16 | | | 1.16 |
| 27 | U-Blade - field | 240 | 5 | 0.38 | 1.65 | 17.65 | | | 17.65 |
| 28 | Fertilizer sidedresser | 1,000 | 10 | 24 | 103 | 0.63 | | | 0.63 |
| 29 | Cultivator, 2 row | 1,750 | 7 | 44 | 172 | 0.95 | | | 0.95 |
| 30 | Wagon | 1,978 | 10 | 57 ea | 249 ea | 0.48 | | | 0.48 |
| 31 | Cultivator, 3 row | 2,250 | 7 | 4 | 15 | 13.93 | | | 13.93 |
| 32 | Truck - 1/2 ton pickup | 13,485 | 5 | 1,771 | 2,779 | 4.37 | 3.52 | 0.53 | 8.42 |
| 33 | Mower | 2,283 | 10 | 9 | 46 | 2.98 | | | 2.98 |
| 34 | Seeder | 175 | 10 | 4 | 10 | 1.05 | | | 1.05 |

*50 total acres

**200 total acres

***Repairs per hour were based on useage of the large nursery. They were computed on the basis of percent of new cost over the life of the asset. Percent factors used were: 90 for item numbers 1, 2, 3, 4, 5, 6, 32; 80 for items 9, 13, 23; 75 for items 14, 15, 25, 28; 65 for items 10, 11, 12, 24, 29, 31; 60 for items 26, 27, 30, 33, 34; 40 for items 7, 17, 18, 19, 20, 21, 22; and 10 for items 8, 16. The total was then divided by the estimated total number of hours the equipment would be asset.

****Fuel was estimated at $ 1.10 per gallon for gasoline drived items, $1.03 for diesel drived items and $0.31 per killowatt for electrical driven.

*****Cost is for a large nursery on which variable costs per hour were based. Cost for the small nursery was lower.

Table 4.--Summary of Annual Fixed, Variable, and Total Costs (Dollars) of Producing Slow Growing Evergreens (Taxus) in the Field in Ohio, 1985.

| Item | 50 Acre Field Nursery* | | | 200 Acre Field Nursery** | | |
|---|---|---|---|---|---|---|
| | Cost | Cost per Salable Plant | Percent of Total Cost | Cost | Cost per Salable Plant | Percent of Total Cost |
| Fixed Cost Items | | | | | | |
| Land and Improvements | 7,061 | 1.70 | 10 | 21,716 | 1.20 | 13 |
| Buildings | 4,740 | 1.14 | 7 | 6,811 | .38 | 4 |
| Machinery and Equipment | 13,173 | 3.18 | 18 | 25,495 | 1.40 | 15 |
| General Overhead | 20,592 | 4.97 | 28 | 32,685 | 1.80 | 19 |
| Interest on General Overhead, Insurance, and Taxes | 1,336 | .32 | 2 | 2,198 | .12 | 1 |
| Subtotal | 46,902 | 11.31 | 65 | 88,905 | 4.90 | 52 |
| Variable Cost Items | | | | | | |
| Propagation | 2,729 | .66 | 4 | 3,560 | .20 | 2 |
| Materials | 4,067 | .98 | 5 | 17,070 | .94 | 10 |
| Machinery and Equipment | 5,894 | 1.42 | 8 | 11,739 | .65 | 7 |
| Labor | 11,389 | 2.75 | 16 | 44,540 | 2.45 | 26 |
| Interest on Operating Capital | 1,445 | .35 | 2 | 4,615 | .25 | 3 |
| Subtotal | 25,529 | 6.16 | 35 | 81,524 | 4.49 | 48 |
| Total Annual Costs | 72,426 | 17.47 | 100 | 170,429 | 9.39 | 100 |

*Total Nursery - 50 acres, 40 acres of growing space, 10 acres production facilities, holding & field bed area, roads, etc.
Slow Growing Evergreens - 10 acres, 8 acres of growing space, 2 acres production facilities, holding & field bed area, roads, etc.

**Total Nursery - 200 acres, 175 acres of growing space, 25 acres production facilities, holding & field bed area, roads, etc.
Slow Growing Evergreens - 40 acres, 35 acres of growing space, 5 acres production facilities, holding & field bed area, roads, etc.